

Implications of the Law of Co-evolution for Subject Integration Teaching in the Lower Elementary School in the Process of Early Childhood Integration

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Abstract: The Compulsory Education Curriculum and Curriculum Standards issued by the Ministry of Education emphasizes the importance of bridging early childhood and primary school, echoing the international trend of promoting bridging through curriculum and teaching. In accordance with this policy guideline, this study, based on the law of synergistic evolution under the perspective of educational ecology, compiled its own Questionnaire on the Status of Subject Integration Teaching in the Lower Secondary Section of Elementary and Middle Schools in the Process of ECCE, analyzed the data from the questionnaire, and followed up with the follow-up study using the interview method. To address the problem of insufficient effective cooperation between horizontal subjects in the "ECE" process, we put forward the following suggestions: optimize the curriculum concept of subject integration teaching, make it clear that the goal of the curriculum reform is to enable students in the lower elementary school section to adapt to school life faster and better, improve students' interest in and efficiency of learning by adjusting the form of teaching and learning, and form a teaching advantage to alleviate parents' anxiety.

1. Introduction

The law of synergistic evolution of educational ecology emphasizes in the elaboration of the positive significance of competition that the impetus generated by competition for educators and educated people can promote the overall educational reform, strengthen cross-penetration and collaboration among disciplines, and improve the quality of teaching and learning. Starting from the curriculum and teaching, the teaching method of discipline integration has been recognized and explored by more and more experts and scholars. In the process of ECE, elementary school in most areas do not fully understand the concept of discipline-integrated teaching, and discipline-integrated teaching is difficult to implement. This study analyzes the problems of subject-integrated teaching in the process of ECE and the application of the law of co-evolution in subject-integrated teaching with the support of research data. Based on the inspiration of the law of co-evolution for optimizing subject integration teaching in the lower primary section of elementary school in the process of "early childhood and primary school convergence", the study combines this law with the optimization of subject integration curriculum design in the lower primary section, and puts forward a proposal for

optimizing subject integration teaching in the process of "early childhood and primary school convergence" in China. The program will be combined with the design of optimized subject-integrated teaching in the lower primary school.

2. The Relevance of "Co-Evolution" and Discipline-Integrated Teaching and Learning

(1) Implications of co-evolution for the "early childhood continuum"

"The role of the law of co-evolution in the educational ecosystem is threefold: first, it promotes educational reform; second, it promotes collaboration among internal elements; and third, it facilitates the cross-fertilization of disciplines. This study focuses on the third aspect, namely, the significance of the law of "co-evolution" for disciplinary integration. For the educational ecosystem, the co-evolution of the disciplinary ecosystem refers to the mutual influence and interaction between disciplines in the disciplinary ecosystem, i.e., through the crossover and infiltration of disciplines, to cultivate students' ability of interdisciplinary learning, and to promote the improvement of the quality of teaching and students' all-round development. The organic combination of co-evolution and disciplinary integration provides a new perspective for curriculum reform, which is both a trend in disciplinary development and an important way to produce innovative results.

(2) Implications of subject-integrated teaching for "bridging the gap between early childhood and primary education"

For students in the lower elementary school, kindergarten teaching method is based on "games" [1], while the traditional teaching method focuses on the instillation of knowledge, the teaching method produces a great change, and some students cannot change the learning method in a short period of time, resulting in backwardness in academic performance. If the lower elementary school teachers can integrate moral education, intellectual education, physical education, aesthetic education, labor education in the language, mathematics, English and other basic subjects, the use of experience, cooperation, inquiry, performance, communication learning methods taught to children in the lower grades, to help children change the learning style, thinking, habits, will ease the problem of academic pressure in the process of bridging the early childhood and primary school, but also better able to cultivate the core qualities of the students, and promote the overall development of students. It can also better cultivate students' core qualities and promote their all-round development.

At the same time, the focus of subject integration is on "breaking boundaries" and "integration" [2], which requires teachers to grasp the key points of teaching multiple subjects while forming their own understanding and ideas, integrating teaching content, reshaping the teaching structure, opening up the teaching pattern, and establishing an interdisciplinary teaching system. In the process of resource boundary-breaking, the core basic teaching content is not missing, and in the process of resource integration, the repetition of learning content of different disciplines is reduced, so that "boundary-breaking" is not "split" and "integration" is not "overlapping". The process of resource integration reduces the repetition and intersection of learning contents of different subjects, so that "boundary-breaking" is not "splitting" and "integration" is not "overlapping". Teachers can also improve their own quality in this process, broaden their own pattern, and continue to learn in teaching.

3. Current situation of subject integration teaching in the lower primary grades in the process of "bridging early childhood and elementary school"

In the process of early childhood and primary school articulation, most of the kindergarten's one-way output [3], the lack of elementary school to kindergarten active linkage, resulting in the learning pressure from the elementary school classroom competition is still inevitably impede the process of "early childhood and primary school articulation". The state attaches great importance to this issue and has issued relevant documents to point out the direction of "two-way articulation" between

kindergarten and primary school. The survey areas for this study were chosen to be representative of Tianjin and Urumqi, one of the major cities in the eastern seaboard and the northwestern region, respectively.

(1) Solidification of teachers' teaching styles

In both districts, the problem of the solidification of teaching styles was prevalent. Elementary school teachers' academic qualifications are concentrated in undergraduate programs, and even though most of the teachers in the questionnaires believe that they "often" or "occasionally" use subject-integrated teaching in their daily teaching, it was found in the interviews that some of the teachers are not clear about the intrinsic meaning of the method itself, and only occasionally mention other subjects in the teaching process of their own subjects. However, in the interviews, it was found that some teachers were not clear about the meaning of the method itself, and only occasionally mentioned other subjects in the teaching process of their own subjects, which was still inherent in the teaching method and could not be called subject-integrated teaching.

In addition, there is an imbalance in teaching resources, as the overall education and teaching experience of elementary school teachers in Tianjin is higher than that of elementary school teachers in Urumqi. Subject-integrated teaching has strong requirements for the school's training program and teachers' personal ability, and highly educated and experienced teachers are the main force of the reform, while Urumqi lags behind Tianjin in the number of teachers with a master's degree and more than 20 years of teaching experience, which makes it more difficult to implement the new concepts in a third-tier city due to the lack of teaching resources. True subject integration requires breaking the boundaries of the original teaching model and reintegrating the knowledge of different subjects to achieve the effect of "1+1>2". In the parent questionnaire, about 1/5 of the parents said that they were concerned about subject integration because they were worried that the teachers' lack of experience in subject integration would delay their children's learning progress and effectiveness. It can be seen that not only the teachers' problem, but also the parents' concern is an important factor in the failure to change the teaching method.

Table 1. Percentage of Primary School Teachers' Academic Qualifications in Tianjin and Urumqi

location \ qualifications	High school	College	Undergraduate	Master's Degree	Doctor
Tianjin	3.60%	5.41%	83.78%	7.21%	0%
Urumqi	0%	12.93%	86.21%	0.86%	0%
Total	3.60%	18.34%	169.99%	8.07%	0%

Table 2. Ratio of Teaching Age of Elementary School Teachers in Tianjin and Urumqi Cities

location \ ages	Up to 5 years	5-10 years	10-20 years	More than 20 years
Tianjin	27.03%	18.02%	19.82%	35.14%
Urumqi	21.55%	32.76%	22.41%	23.28%
Total	48.58%	53.78%	42.23%	58.42%

(2) Parental attitudes and the factors influencing them

Good home-school cooperation can optimize the learning and educational environment, form a harmonious family atmosphere, make up for the time and space gap through the family and the school each other, so that the child's growth is in a coordinated educational process, the school and the family coordinate with each other, will play the biggest educational function. [4] Especially for students in the lower elementary school, the guidance and help of parents is more critical. In the survey, it was found that most parents had concerns about subject-integrated teaching, and a small number of parents said they could not understand the reform of this teaching method at all. Parents' unwillingness to actively cooperate with the reform, or even their strong resistance to it, will greatly increase the

difficulty of changing teaching methods.

In addition, for the question of whether the child's adaptive ability affects the parents' attitude to try, the data of Tianjin parents' responses show a difference: for the question of whether the child's academic performance affects the parents' cognitive attitude, the data of Urumqi parents' responses show a significant difference, which shows that the better the student's academic performance and the better the adaptive ability, the more positive the parents' attitude toward subject-integrated teaching is positive. Therefore, it is analyzed that individual differences in students are important factors influencing parents' attitudes.

Table 3. Chi-square test of Tianjin parents' response data on whether children's adaptability influences parents' attitudes toward experimentation

	value	Degree of freedom	Asymptotic significance(two-sided)
Pearson's chi-square (math.)	22.479 ^a	10	.013
Likelihood ratio	21.557	10	.018
Linear correlation	6.117	1	.013
Number of valid cases	167		

Notes:

1. The tested questions were Question 3 "How long did it take your child to adapt to elementary school?" in the Tianjin Parents' Paper. *and Question 13: "Would you like to try subject-integrated teaching in your child's school?" 2.
2. p-value (asymptotic significance) less than 0.5 means different, less than 0.01 means significantly different

Table 4. Chi-Square Test for Urumqi Parent Response Data on Whether Children's Academic Achievement Affects Parents' Cognitive Attitudes

	value	Degree of freedom	Asymptotic significance(two-sided)
Pearson's chi-square	22.367 ^a	4	.000
Likelihood ratio	22.876	4	.000
Linear correlation	16.088	1	.000
Number of valid cases	426		

Notes:

1. The tested questions were Question 4 "What is your child's current academic performance?" and Question 9 "Do you think curriculum integration is good for your child's adaptation to elementary school?" and question 9: "Do you think the curriculum integration teaching method is good for your child to adapt to elementary school?" 2.
2. P-value (asymptotic significance) Less than 0.05 means there is a difference, and less than 0.01 means there is a significant difference.

(3) Individual differences in students are evident

Students are the main body of early childhood and primary school articulation. Whether it is a curriculum reform or a change in the way of teaching, the fundamental purpose is to help students in the lower elementary school segments to adapt to elementary school as soon as possible, and to promote the all-round development of students. In response to the question of whether the individual ability of students affects their interest in subject-integrated learning content, the data show that the

better the grades and the more adaptable the children are, the more they are able to accept subject-integrated teaching, and the more they are motivated to do homework when other subjects appear in their homework. The shift in teaching style is intended to enable the less adaptable children to adapt as quickly as possible, but the survey suggests that not every child may be suited to this style of teaching, and in interviews, teachers stated that "this group of students does respond slower when organizing these types of activities." This may encourage the more able students to become more competitive, while the less able students remain behind. The solution to this problem requires collaboration between home and school, mutual understanding and support, and a smooth transition.

Table 5. Cardinality of parent response data of Tianjin and Urumqi on whether individual student ability affects students' interest in subject-integrated learning content chi-square test

		Value	Degree of freedom	Asymptotic significance (two-sided)
Tianjin	Pearson's chi-square	14.977a	4	0.005
	Likelihood ratio	14.854	4	0.005
	Linear correlation	8.652	1	0.003
	Number of valid cases	167		
Urumqi	Pearson's chi-square	26.223a	4	0
	Likelihood ratio	26.924	4	0
	Linear correlation	25.555	1	0
	Number of valid cases	426		

Notes:

1. The tested questions were Question 4, "What is your child's current academic performance?" and Question 8, "Does the presence of other subjects in the homework increase your child's motivation to do homework?" in the Tianjin and Urumqi Parent Papers. and Question 8: "Does the presence of knowledge of other subjects in homework increase your child's motivation to do homework?".
2. P-values (asymptotic significance) of less than 0.05 mean that there is a difference, and less than 0.01 means that there is a significant difference.

4. Implications for optimizing the design of subject-integrated teaching curricula in the lower primary grades

In the whole ecosystem, the education system, as one of the factors, is closely related to other factors in the ecosystem. In the process of ECCE, emphasis should be placed on the correlation between elementary school and kindergartens to realize a benign two-way connection. While the curriculum is the core of school education, ECCE must ultimately be carried out with the implementation of kindergarten and elementary school curricula [5], how can the curriculum be reformed?

(1) Optimization philosophy: guided by the law of co-evolution, progress through collaboration

The key to applying the law of synergistic evolution to ECE lies in the development of a sense of collaboration and reform between elementary school and kindergartens, between teachers of different disciplines, and between schools, teachers, and parents, and subject-integrated teaching is highly

compatible with the synergistic evolutionary concept of the pedagogical approach. The promotion of subject-integrated teaching must start from three aspects. On the one hand, the school's training program and teaching philosophy influence teachers' teaching methods. Primary school, as a primary education, lays the foundation for a person's entire educational experience, so it is important to look at the long term, to base on the future of education, and to help teachers to establish a critical thinking, not to stick to the old ways and to be innovative, and to dare to be a leader in subject-integrated teaching. On the other hand, teachers themselves should broaden their teaching pattern and utilize the combination of online and offline to obtain more quality resources for subject-integrated teaching. In addition, for parents, it takes time for parents to accept this innovative teaching mode. Teachers should firstly do a good job of parents' emotional relief, and they can utilize the research results they have already achieved to make parents clear about the advantages of subject-integrated teaching, change their concepts, and gain parents' understanding and support. Parents' expectations of subject integration teaching can be transformed into a driving force for school reform, enhance teachers' confidence in teaching, and become active monitors of students' learning.

(2) Optimizing goals: science for early childhood and primary school integration for growth

The goal of the two-way bridging of primary and early childhood is to create subject integration through subject-integrated teaching, to stimulate the learning interests of students in the lower primary grades, to enable them to develop good learning habits, to build up their self-confidence in learning, to master knowledge more easily, to adapt to classroom teaching faster and better, and to cultivate their core literacy skills. The target group of ECCE is students in the lower elementary school, and the students should be benefited through subject integration teaching, so the teaching content must be of good quality and gradually develop to high quality, avoiding the phenomenon of subject integration teaching, which is exposed as fake and empty, with empty name but no real teaching measures, or the content is too profound and not suitable for students to learn. At the same time, the development of subject integration teaching in the process of ECE promotes localization and individualization, and requires the formulation of appropriate teaching objectives in accordance with the specific teaching and learning situation in the local context. As there are great differences in the political, economic and cultural aspects of different districts, the implementation of subject integration teaching needs to take into account the economic conditions of the schools, such as the allocation of funds for innovative research and the planning of teaching venues. At the same time, we also need to consider whether the teaching level of teachers is able to conduct subject integration teaching and whether the learning ability of local students can adapt to subject integration teaching, so as to realize the integration of course in a more practical and effective way.

(3) Optimizing practice: rational solutions to practical challenges and teaching out of the comfort zone

In the face of the problems that may be encountered in teaching practice, firstly, the education sector needs to provide further effective guidance for the scientific realization of the transition from kindergarten to lower primary school. Under the background of the "double reduction policy", the teaching concept of subject integration fits the needs of the development of the education cause, therefore, the education sector should accurately and promptly convey the teaching concepts and methods of scientific realization of the transition from kindergarten to lower primary school to the first-line teachers. Therefore, the education department should timely and accurately convey to frontline teachers the teaching concepts and methods of scientifically realizing the transition from kindergarten to lower elementary school, and broaden the ideas and provide support for teachers' teaching activities. Secondly, in terms of teachers' curriculum design, we learned from the interviews that there is little communication between teachers of different disciplines, and the curriculum design of disciplinary integration requires multidisciplinary cooperation and communication, which requires teachers of different disciplines to form a multidisciplinary teaching team to optimize the teaching

plan together and to establish a meaningful link between different disciplines, so as to Make students learn in a broad field; Third, in terms of students, for students with difficulties need to be guided patiently, teachers adjust classroom teaching methods to improve teaching efficiency to effectively focus students' attention, increase learning interest, help students form a knowledge system as soon as possible, enhance their understanding of knowledge points, and alleviate the fear of difficulty. In addition, teachers need to pay more attention to cultivate students' good habits, so that the lower elementary school students can better transition from kindergarten to elementary school. Fourthly, in terms of parents, they should understand parents' concerns about the reform, and through a combination of conceptual communication and practical teaching, convey to parents the message that the subject-integrated teaching model is conducive to students' development, so as to alleviate parents' anxiety about their children's transition from kindergarten to the lower elementary school, and to make parents recognize and accept such a teaching model. In the process of practicing the discipline-integrated teaching method, we focus on summarizing and reflecting on the experience, enriching the theory so that the theory can better guide the practice, and so on and so forth, moving forward, so that the practice of discipline-integrated teaching under the law of synergistic evolution will continue to develop in a good direction.

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